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## **‘HIV/AIDS, TB and Nutrition’ – ASSAf Report**

About 18 months ago, the Council of the Academy of Sciences of South Africa (ASSAf) appointed a Study Panel of eminent scientists to examine and collate the most relevant and reliable evidence on the influences of nutrition on human immunity, particularly in respect of HIV infection and active tuberculosis in South Africa. The decision to focus on this topic was sparked by the prevailing debates and public uncertainty in South Africa regarding the role of nutrition and nutritional supplements such as vitamins and minerals in the management of HIV infection.

The Study Panel report released a few weeks ago under the title ‘HIV/AIDS, TB and Nutrition’ observes that South Africa is currently in the throes of three distinct epidemics – malnutrition, HIV infection and TB. The prevalence of each is sufficiently high that the same communities may be affected by all three epidemics in a purely mathematical overlap, but there is also *prima facie* evidence from observational studies that the three epidemics are in fact often linked in a synergistic relationship in which they mutually reinforce and facilitate one another. The report provides up-to-date and in-depth epidemiological summaries of each. This editorial will however largely concern itself with nutrition and HIV infection.

### **Why nutrition is important for the immune system**

The body defends itself against microbial invasion by activating its quite complex immune system, and mobilising what the report dubs the ‘flamethrowers’ or respiratory burst whose central role is the intracellular killing of pathogenic organisms by oxidation or ‘burning’. This in turn relies on the availability of energy stored in energy-yielding fuels such as carbohydrates and fats to fuel the ‘respiratory burst’. Largely for this reason, the resting energy expenditure in HIV-infected individuals is increased by at least 10% compared with non-infected persons. This critical chain of complex defensive mechanisms (involving regulatory hormones, neuropeptides, cytokines and neurotransmitters) is obviously undermined if the infected person is not kept supplied with adequate energy-laden macronutrients such as carbohydrates and fats.

Micronutrients (vitamins and minerals) are equally important as part of the nutritional landscape for the optimal functioning of the immune system. For example, the vitamin B complex – thiamine, riboflavin and niacin – has a critical role in the Krebs cycle via which the required energy is generated. However, oxidants are indiscriminate warriors that will attack and destroy both invader and host cells alike. For this reason, there is a need for ‘fire extinguishers’, and micronutrients fulfil the parallel and important role of serving as antioxidants whose function is to limit and contain the destructive effects of oxidants on the host cells.

### **HIV infection and nutrition**

HIV infection is associated with weight loss and wasting, both of which are independent contributors to poor clinical outcome. The reasons for the weight loss and wasting are multifactorial, and include the increased resting energy expenditure, food scarcity, and decreased absorption of ingested food due to gastrointestinal disease or viral disruption of the intestinal mucosa. Although a 10% or greater loss of body weight over a year is not uncommon in HIV, there is in fact a high degree of variability in the extent of weight loss and wasting which, not infrequently, is causally associated with secondary infection. Whole-body protein turnover may be as high as 25% in untreated HIV sufferers, leading to cachexia. Also, as already mentioned, resting energy expenditure is increased by 10% in HIV-infected people.

It would therefore appear to stand to reason that nutritional intervention in people with HIV infection will improve survival and/or quality of life, but hard evidence to this effect is woefully lacking. Very few randomised, placebo-controlled trials have been conducted in this regard. There is preliminary evidence, however, that specific dietary supplements such as amino acid mixtures increase body weight and reduce HIV viral load. Supplementation with medium-chain triglycerides reduces HIV-associated intestinal dysfunction and fat malabsorption. And ready-to-use therapeutic food improves nutritional status in severely malnourished children.

Micronutrients (vitamins and minerals) are essential to immune function, and deficiencies may therefore act as co-factors in HIV transmission and progression. Micronutrient deficiencies are common in HIV-infected people. Multivitamin supplementation has been shown in observational studies to result in a 40 - 48% slower progression to AIDS and a 40 - 60% reduction in the risk of death after 8 years of follow-up. But here again, there is an unhappy lack of sufficiently powered randomised controlled trials to confirm these benefits.

The World Health Organization, the Southern African HIV Clinicians Society and the Department of Health have all published guidelines for nutrition in HIV/AIDS that have been collated in the ASSAf report. But the report also identifies gaps in our knowledge regarding HIV and nutrition, and recommends areas and topics that ought to be prioritised for research.

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